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Imahata

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(54) **GAME APPARATUS HAVING A SPHERICAL OBJECT DROP MECHANISM**

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(52) **U.S. Cl.** **473/282**; 211/15; 206/315.9; 221/251; 221/295; 224/919
(58) **Field of Search** ..... 473/134, 137, 473/132, 282, 286, 558, 559, 564, 316; 211/15; 206/315.9; 221/295, 312 R, 251, 175, 298, 299; 224/919

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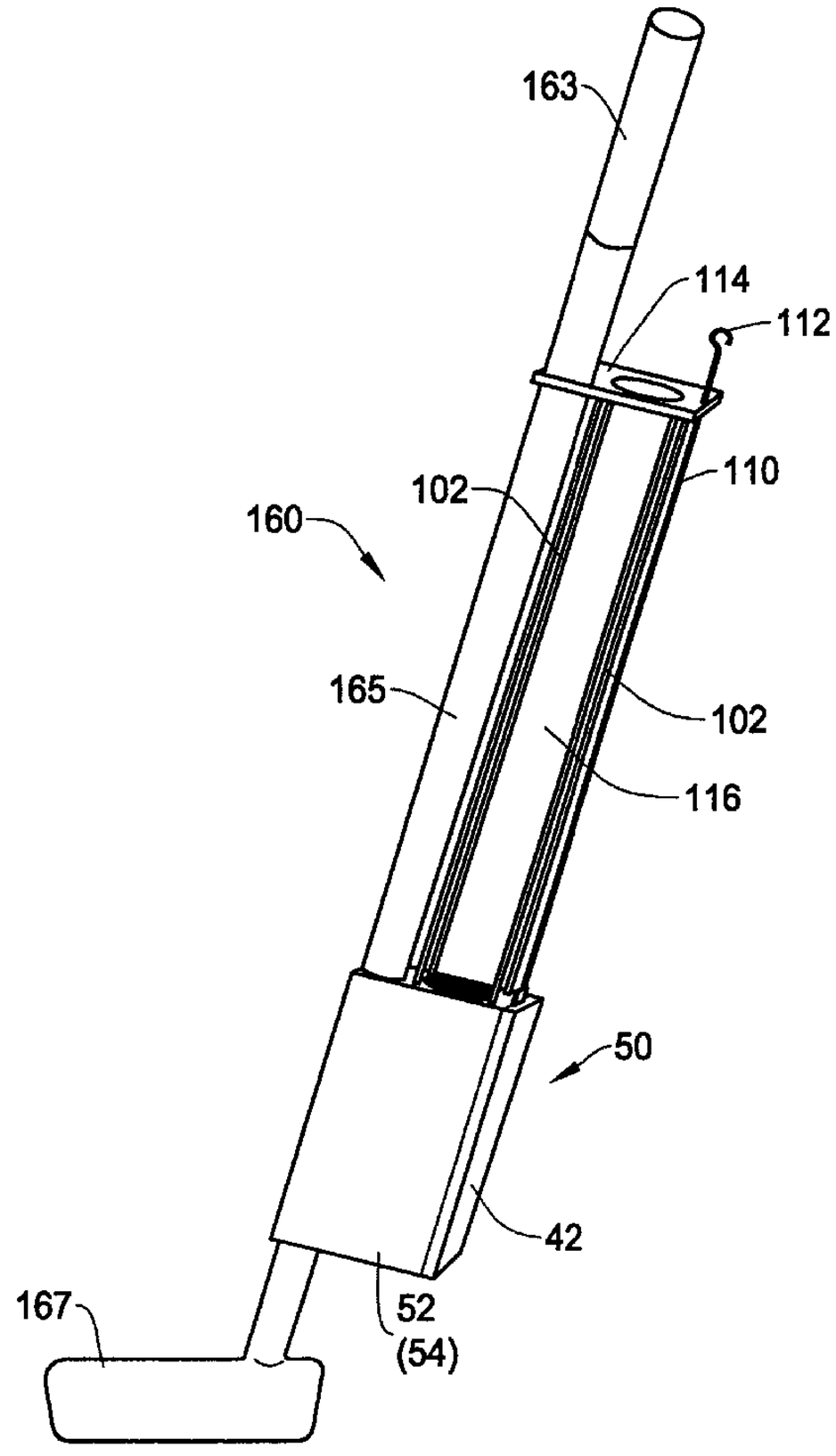
(74) *Attorney, Agent, or Firm*—Muramatsu & Associates

(57) **ABSTRACT**

A game apparatus has a mechanism allowing to drop spherical objects one by one on the desired positions on the ground. The spherical object drop mechanism includes a housing for storing a plurality of spherical objects to allow vertical movements of the spherical objects therein by their own weight, a first stopper provided in the housing for stopping the vertical movement of the spherical objects, a second stopper provided in the housing located at a location lower than the first stopper by the distance corresponding to the diameter of the spherical object for stopping the vertical movement or releasing the stop operation of the spherical objects, a stopper drive mechanism to operate the first stopper and the second stopper opposite to each other, and a knob to operate the stopper drive mechanism from outside.

12 Claims, 7 Drawing Sheets



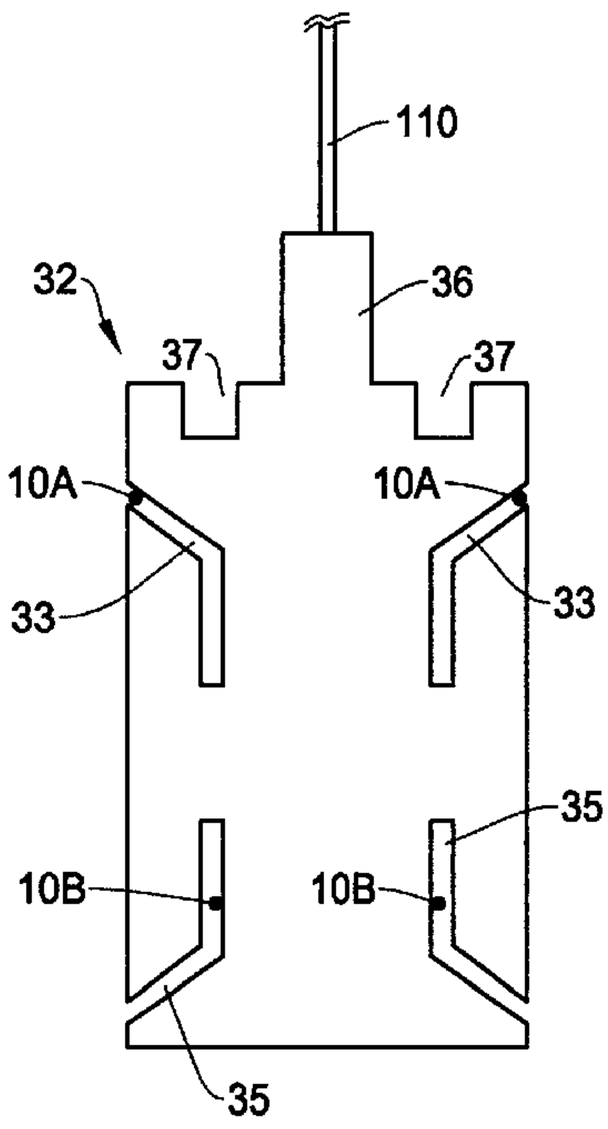
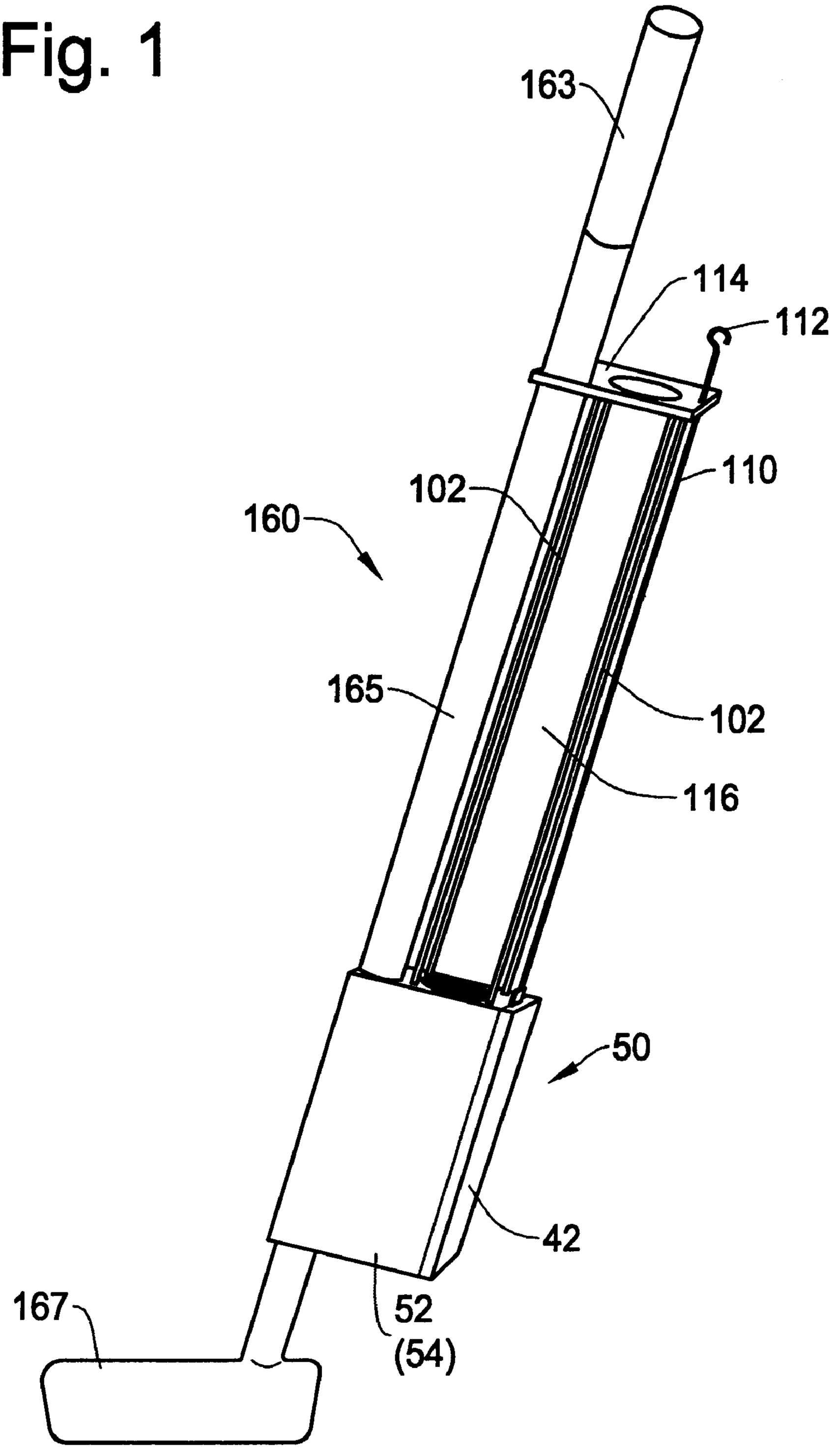


Fig. 1



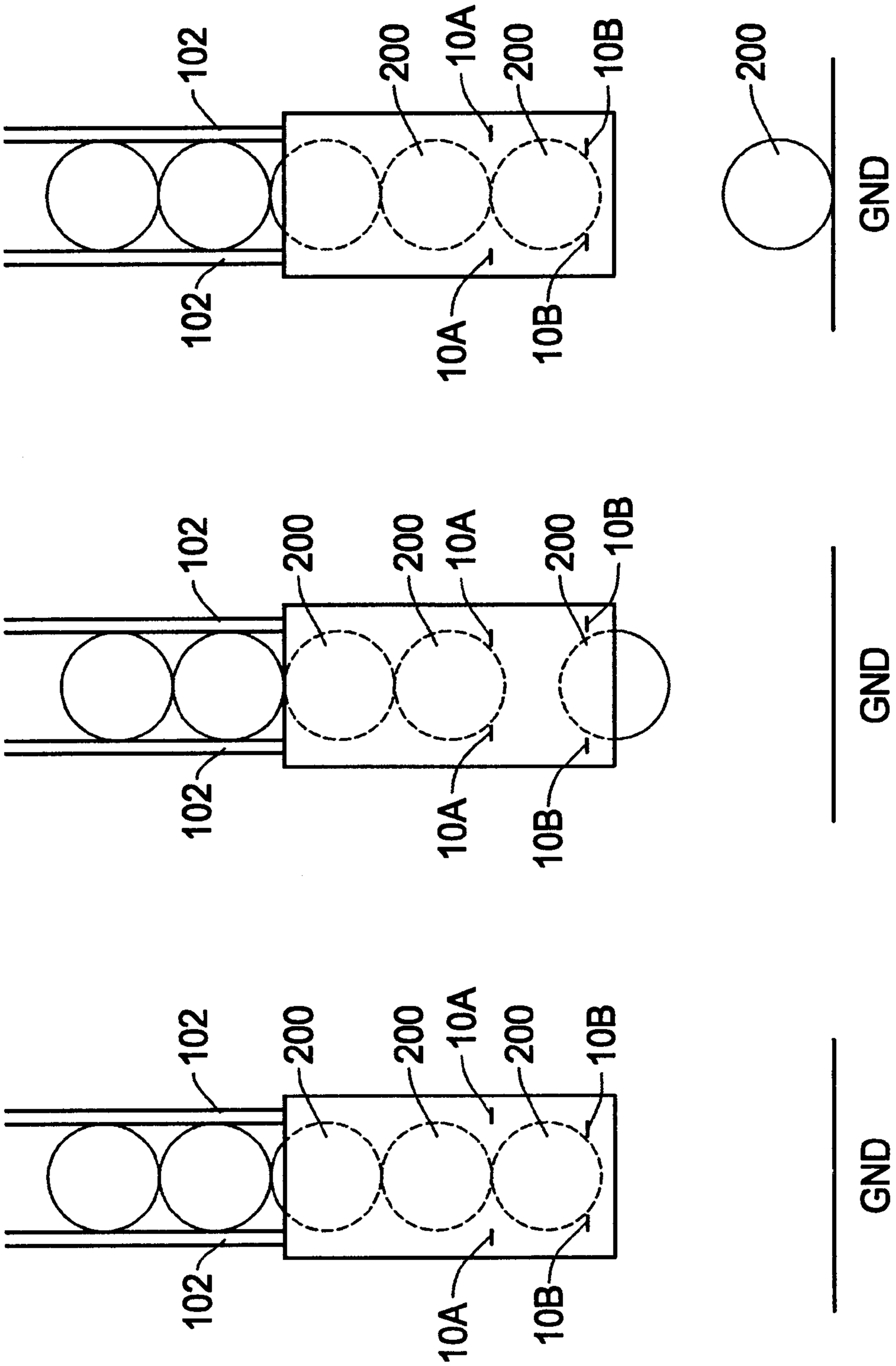


Fig. 2C

Fig. 2B

Fig. 2A

Fig. 3A

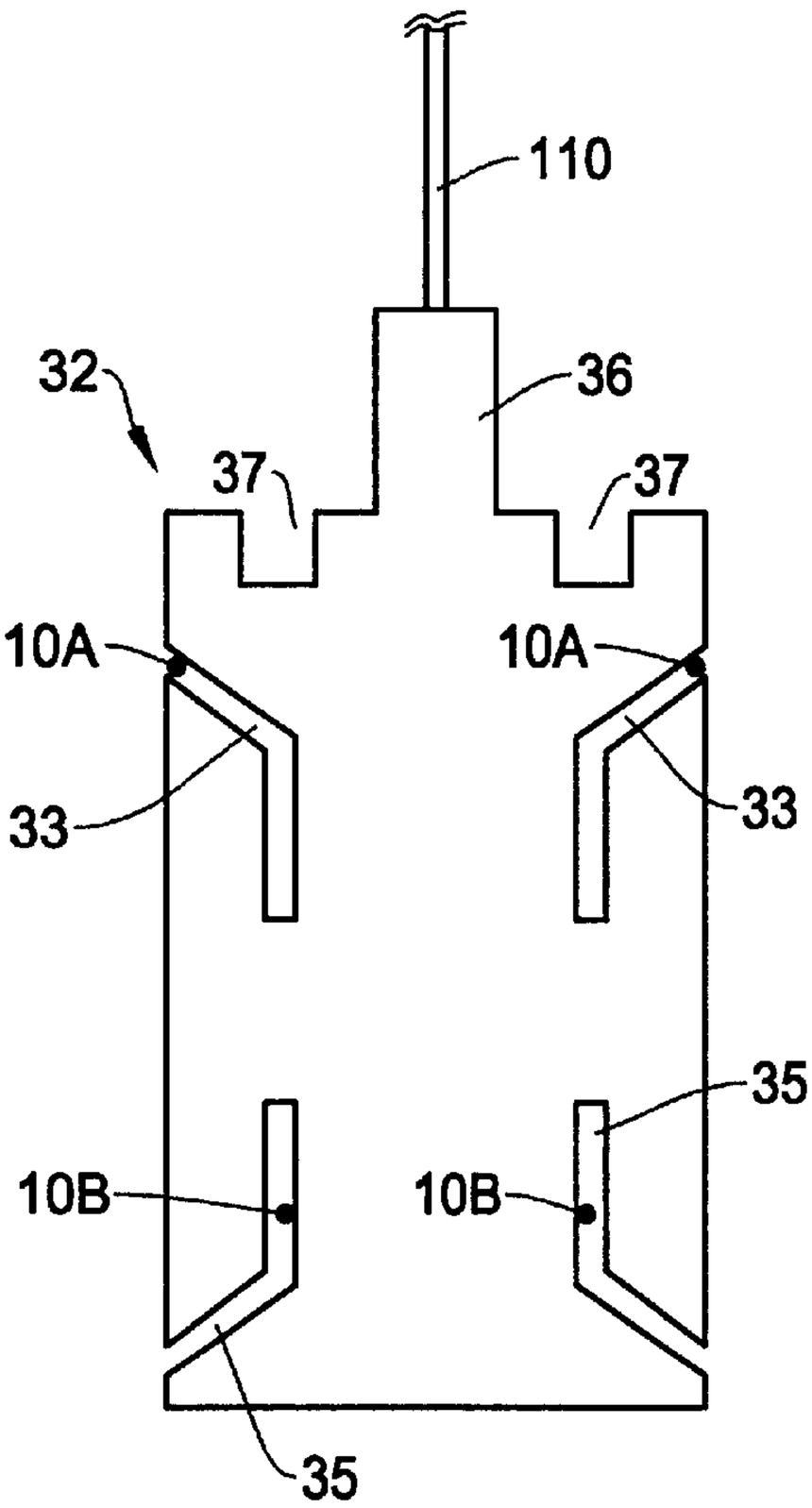

110
32
36
37
37
10A
10A
33
33
35
10B
10B
35

Fig. 3B

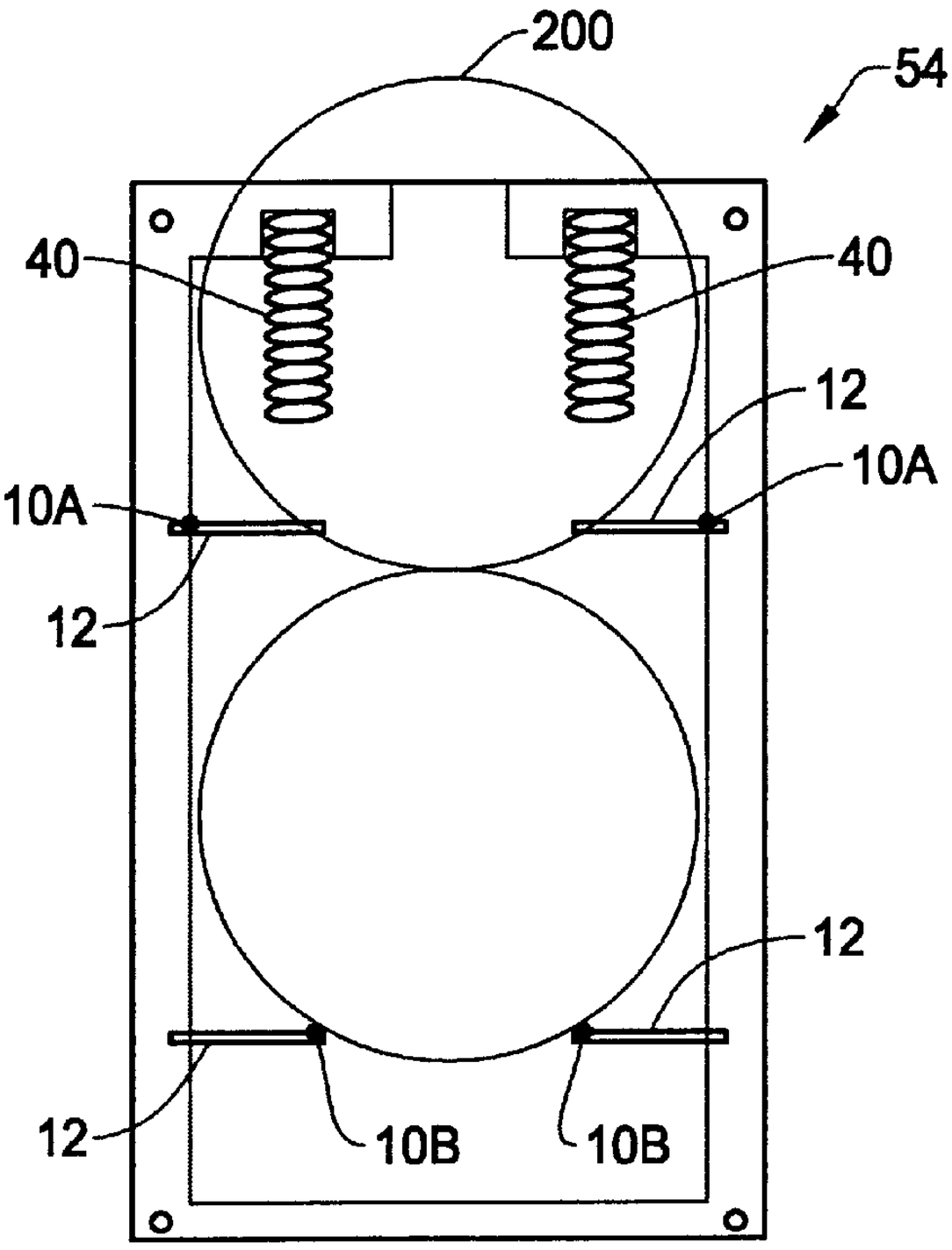

200
54
40
40
12
10A
10A
12
12
12
10B
10B

Fig. 4A

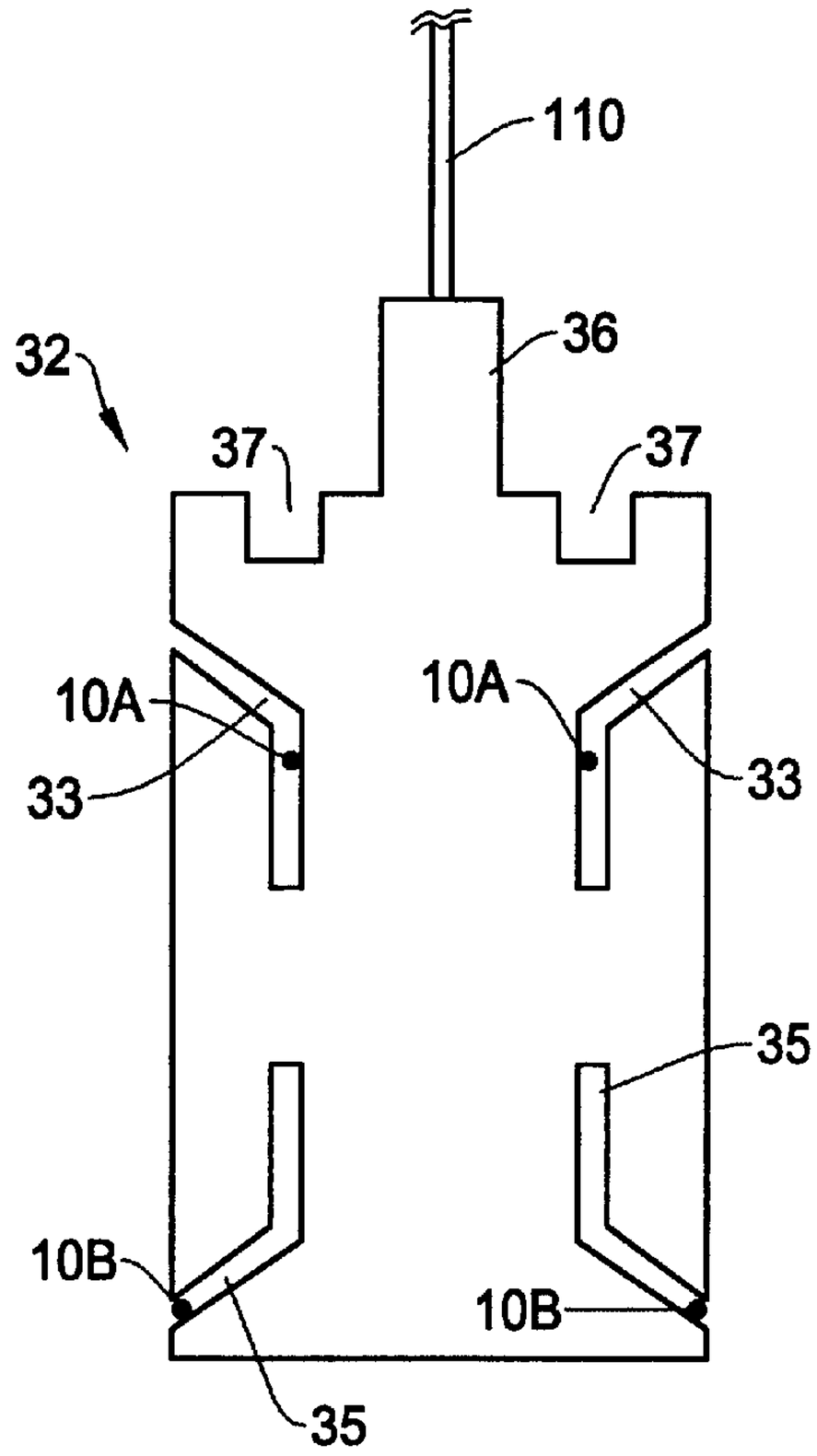

110
32
36
37
37
10A
10A
33
33
35
10B
10B
35

Fig. 4B

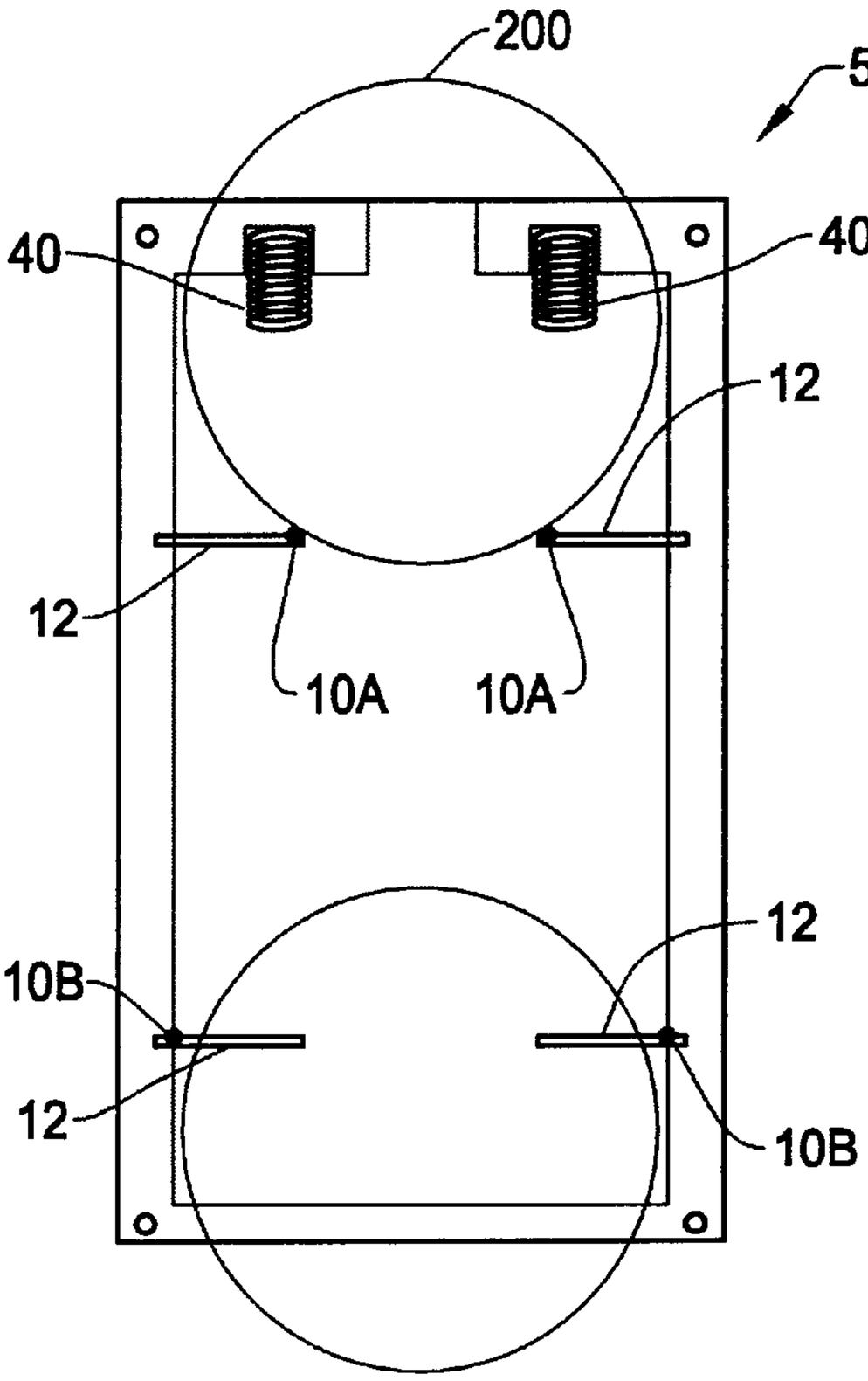

200
54
40
40
12
12
12
10A
10A
12
10B
12
10B

Fig. 5A

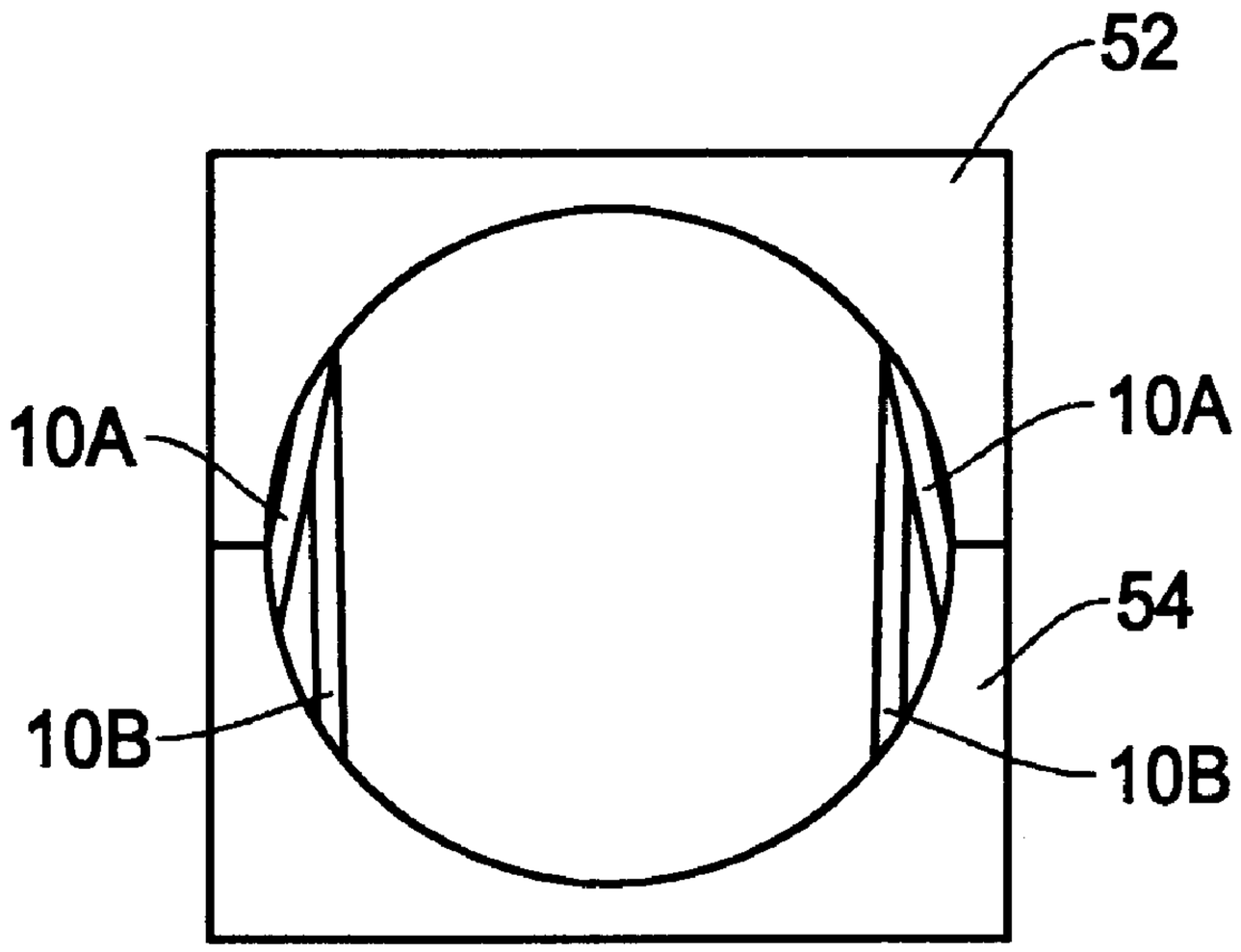
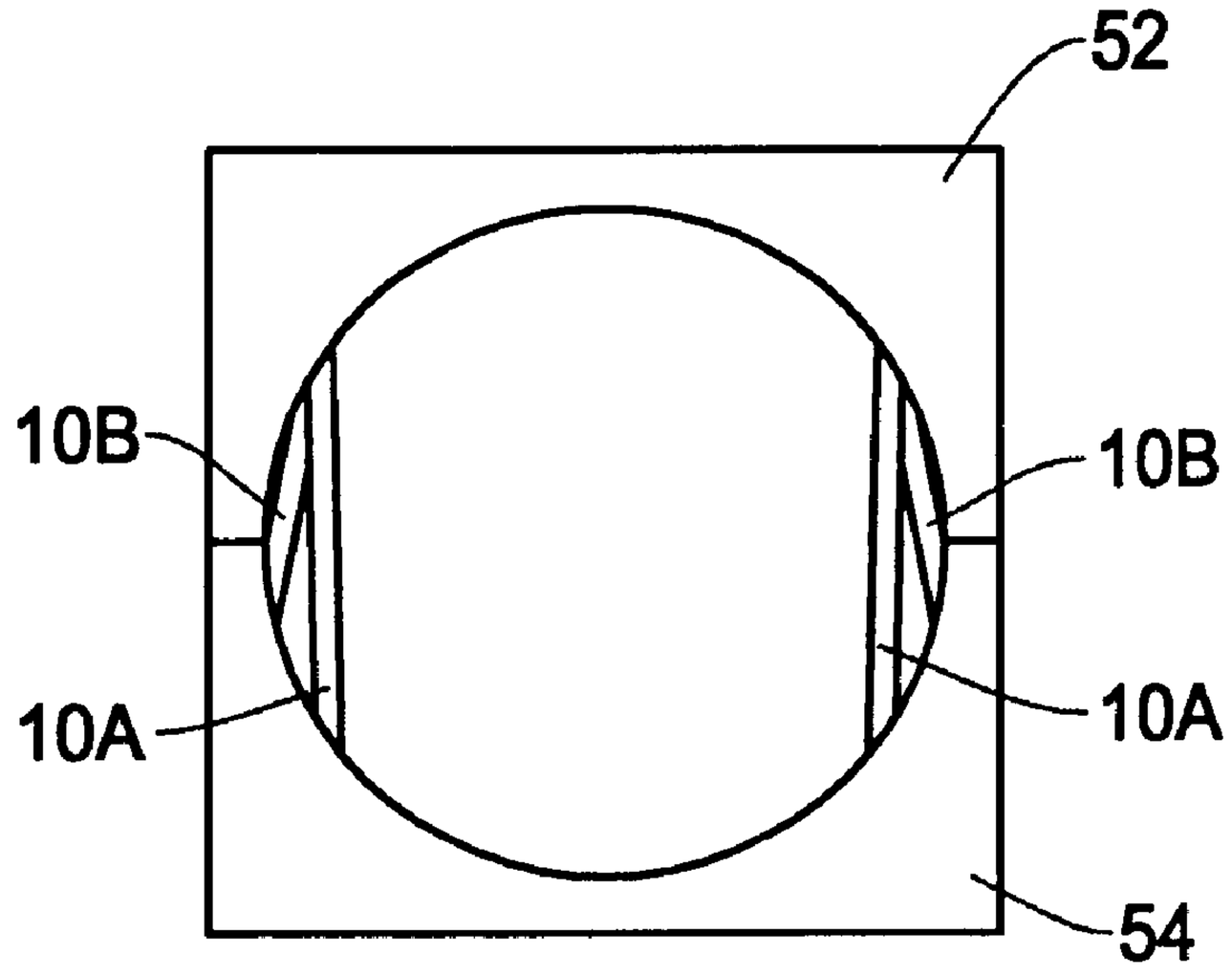


Fig. 5B



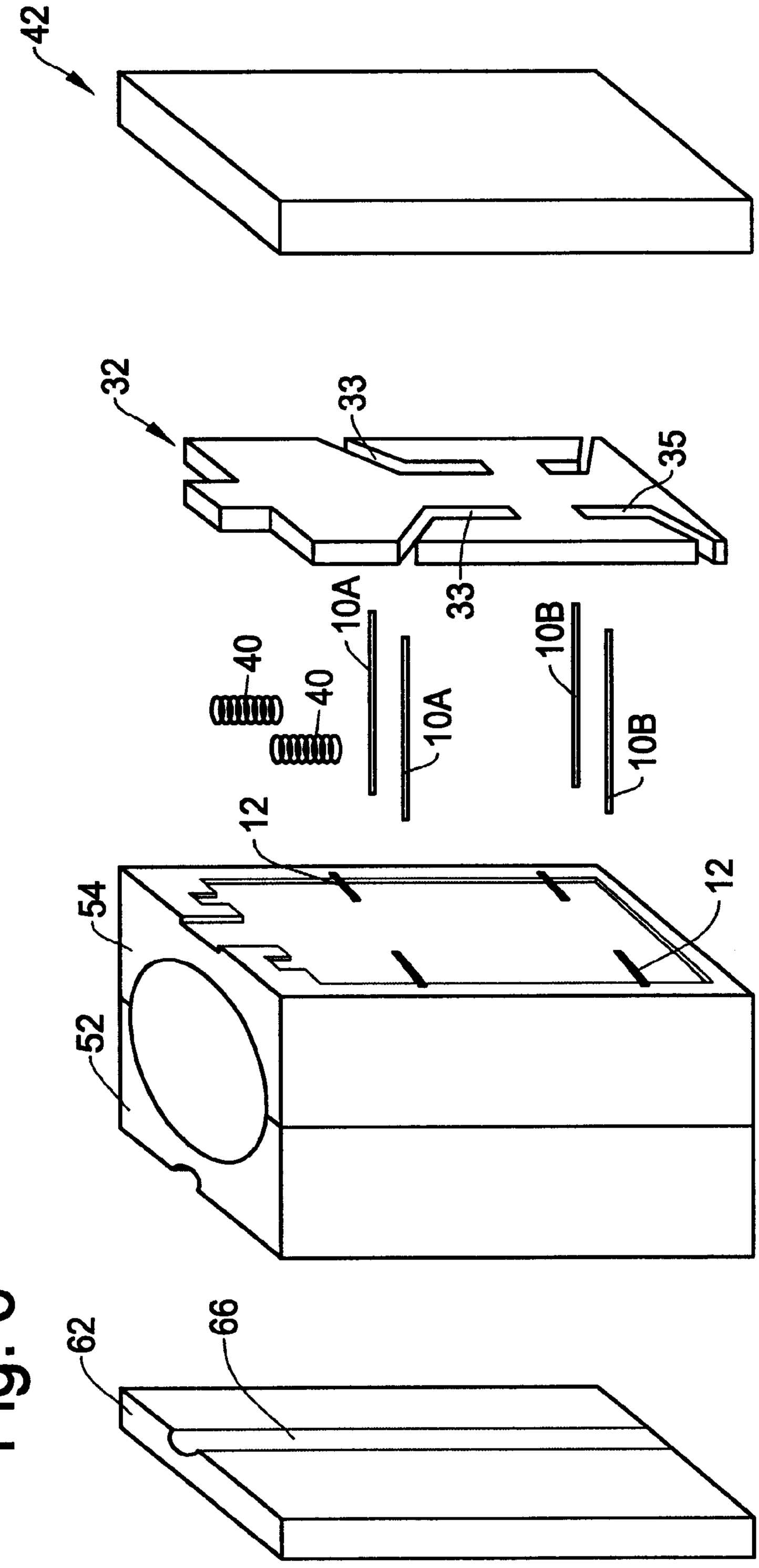


Fig. 6

Fig. 7A

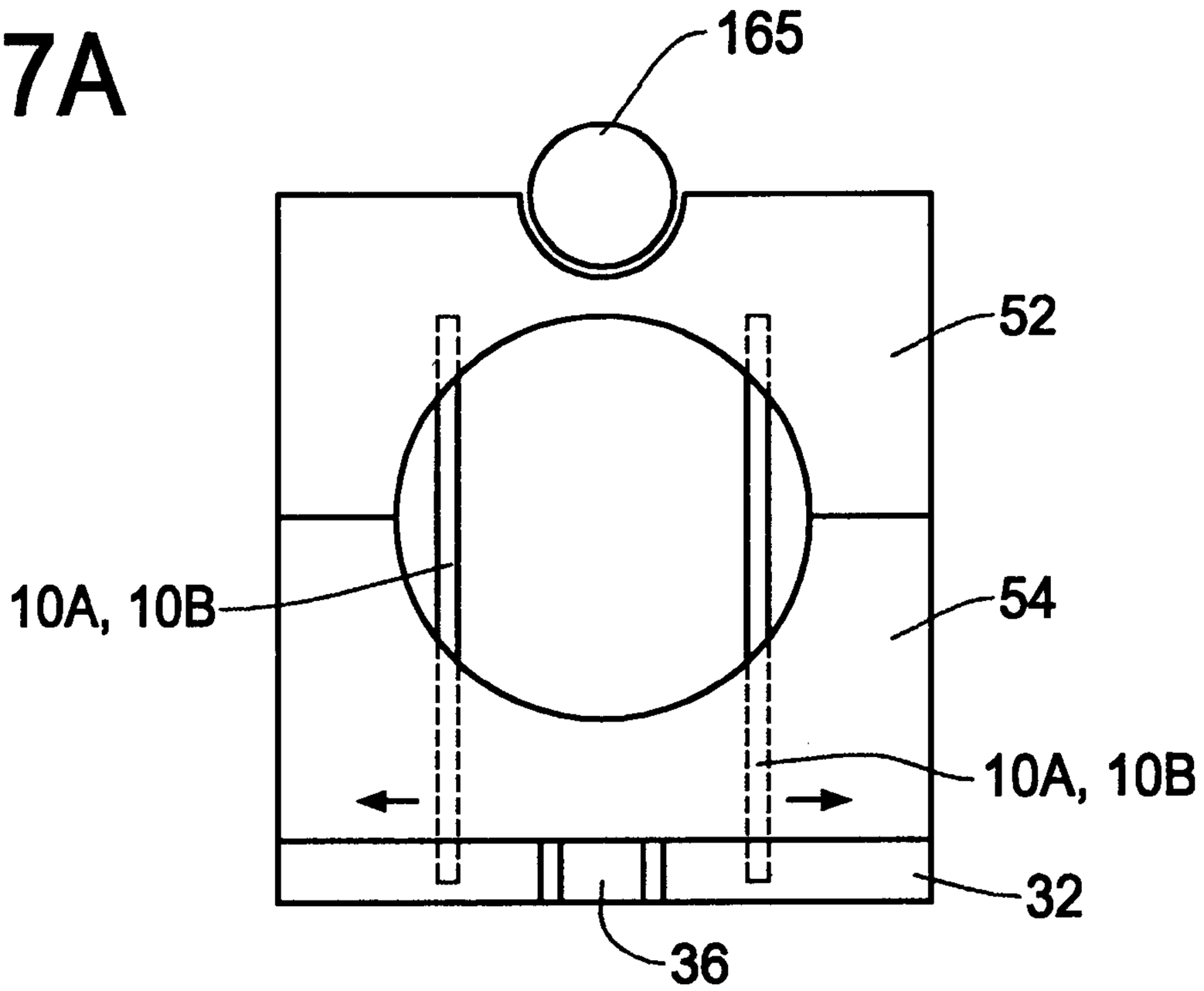
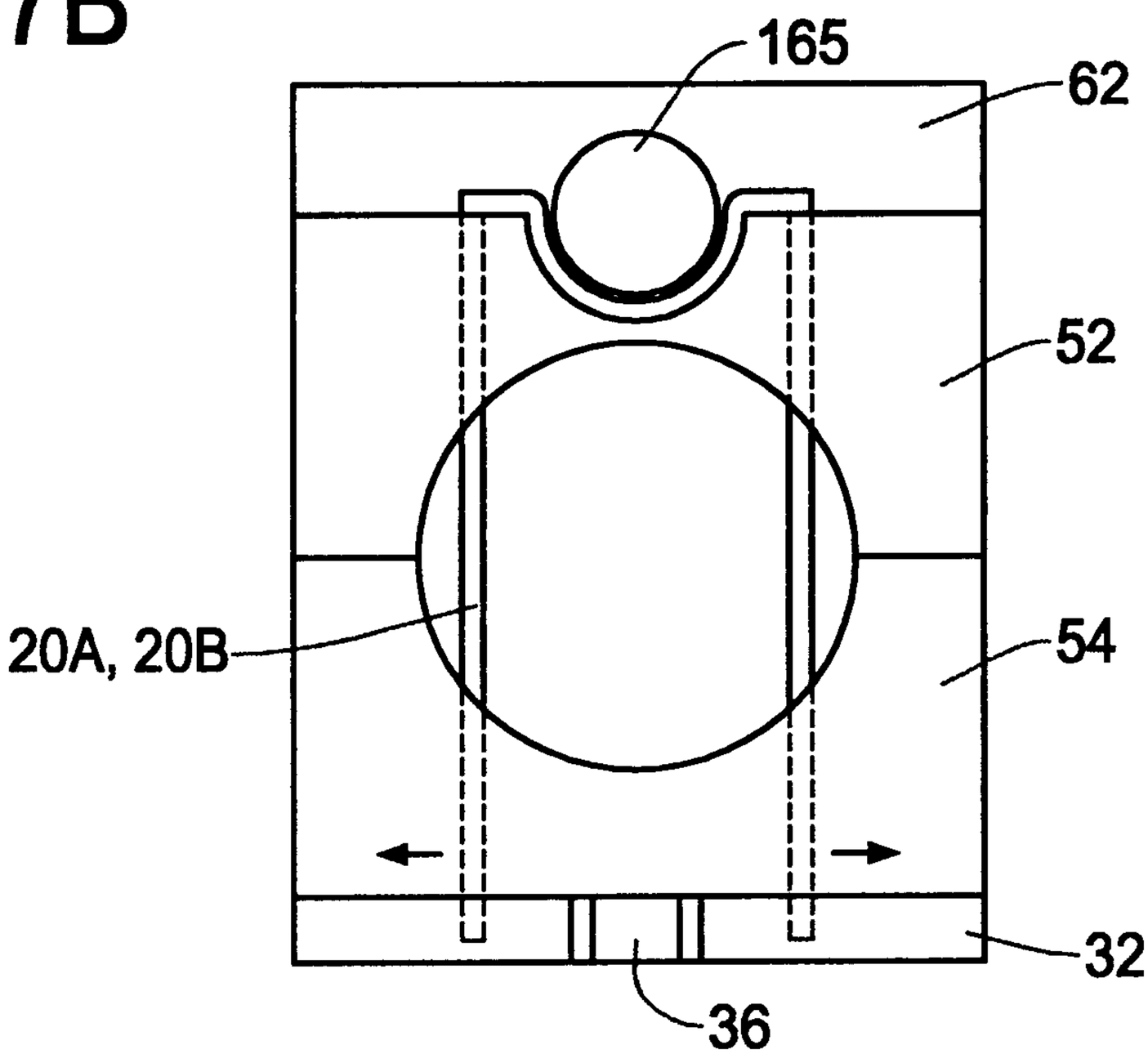


Fig. 7B



GAME APPARATUS HAVING A SPHERICAL OBJECT DROP MECHANISM

FIELD OF THE INVENTION

This invention relates to a game apparatus having a mechanism to drop an object one by one. In particular, this invention relates to a game apparatus having a mechanism to store spherical objects such as golf balls and drop them onto the ground one by one by mechanical means.

BACKGROUND OF THE INVENTION

Men and women of all ages are enjoying the game of golf. Golf is a game to hit the ball having a diameter of about 4.3 cm (centimeter) on the ground with a lesser number of strokes to put the ball in a hole or cup on the green.

The game of golf can be roughly classified in its procedure into a process of placing the ball onto a green where a hole exits by using clubs like iron and wood, and a process of putting wherein the ball on a green is hit into the hole by using a putter.

When a player practices putting or plays putting as recreation, the player has to place a ball on the ground (placement). Hence, in order to practice putting ten (10) times, the player has to place the ball ten times. The routine of placing the ball is frustrating. Moreover, bending down to place a ball may pose significant difficulty for an elderly player or a player with a back pain. When a player practices putting with many balls, the player has to carry a container storing many balls such as a bag.

Thus, a means is desired to place a ball automatically without a player's action to bend over the ground to place a ball. A possible apparatus to achieve this objective can be classified into an apparatus mounting a spherical object drop mechanism to a club, and into an apparatus having a spherical object drop mechanism separately provided thereto.

If the apparatus to mount the spherical object drop mechanism independently from a golf club is to be used, the apparatus having the spherical object drop mechanism needs to be brought over with a player in addition to golf clubs. Moreover, when the spherical object drop mechanism is large, it must be fixed to a specific location on the ground and thus, the ball must be placed only on the same position.

For the apparatus to mount spherical object drop mechanism to a golf club is to be used, it is conceivable to place a ball on the ground with an electric powered mechanism. However, such a structure becomes complex, expensive and inconvenient since an electric power supply such as a battery must be used.

Thus, it is desirable to have a mechanism that allows ball placement on the desired position on the ground by mechanical means with simple structure and low cost.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide a game apparatus that allows to drop spherical objects one by one to be placed on desired positions on the ground.

It is another object of the present invention to provide a game apparatus having a container to store spherical objects therein and a mechanism that allows one spherical object to be dropped while preventing other spherical objects from being dropped.

It is a further object of the present invention is to provide a golf ball game apparatus which integrally includes a mechanism for dropping a golf ball one by one on the ground and a storage container of golf balls.

The game apparatus of the present invention has a mechanism allowing to drop a spherical object one by one on the desired positions or spots on the ground. The spherical object drop mechanism includes:

- a housing for storing a plurality of spherical objects to allow vertical movements of the spherical objects therein by their own weight;
- a first stopper provided in the housing for stopping the vertical movement of the spherical objects;
- a second stopper provided in the housing located at a lower location of the first stopper by the distance corresponding to the diameter of the spherical object for stopping the vertical movement or releasing the stop operation of the spherical objects;
- a stopper drive means to operate the first stopper and the second stopper for stopping and releasing in the opposite way with each other; and
- a knob to operate the stopper drive means from outside.

The game apparatus having the spherical object drop mechanism of the present invention enables to drop a ball one by one onto desired positions on the ground. Since the game apparatus of the present invention has a simple mechanical structure, it is strong and reliable requiring less maintenance, and can be produced economically with low cost.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing an overall outside appearance of the game apparatus of the present invention wherein the spherical object drop mechanism is attached to a golf club.

FIGS. **2**A–**2**C are schematic cross sectional view showing the operation of the spherical object drop mechanism of the present invention.

FIG. **3**A and FIG. **3**B are cross sectional views showing the inner structure of the spherical object drop mechanism of the present invention wherein the lowermost ball is caught (stopper is activated) by the mechanism.

FIG. **4**A and FIG. **4**B are cross sectional views showing the inner structure of the spherical object drop mechanism of the present invention wherein the lowermost ball is dropped (stopper is released) from the mechanism.

FIGS. **5**A and **5**B are schematic top views showing the spherical object drop mechanism of the present invention to be attached to the golf club.

FIG. **6** is an exploded view of the spherical object drop mechanism of the present invention.

FIG. **7**A is a cross sectional view showing a first example of stopper mounting structure of the spherical object drop mechanism of the present invention. FIG. **7**B is a cross sectional view showing a second example of stopper mounting structure of the spherical object drop mechanism of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The spherical object drop mechanism of the present invention attached to a golf club is explained with reference to FIG. **1**. The spherical object drop mechanism **50** is fixed to a golf club **160** by, for example, screws (not shown). Namely, the spherical object drop mechanism **50** is connected to the golf club **160** in a manner to surround a club

shaft **165** of the golf club at lower housings **52** and **54** and an upper support **114**.

Between the upper support **114** and the housings **52** and **54**, a ball guide **102** is provided to form an inner space. The inner space is to store spherical objects such as golf balls inserted from the insertion opening of the upper support. It is apparent that such an inner space for ball storage can be achieved by many other configurations, and the ball guide **102** in FIG. **1** is merely an example.

A handling bar **110** is provided in parallel to the guide rail **102**. The upper end of the handling bar **110** has a knob **112** to pull the handling bar **110** upward. When a user (player) pulls the knob **112**, the handling bar **110** also moves upward, and activates the stopper mechanisms in the spherical object drop mechanism **50**. Thus, the structure of the drop mechanism **50** is so configured as to drop a ball one by one onto the ground by pulling the knob **112**.

It is desirable to use lightweight and inexpensive material such as plastic for the spherical object drop mechanism **50** of the present invention so that the game apparatus as a whole may not become very heavy. By the game apparatus of the present invention, a user can grip the grip area **163** of the golf club to hit a ball on the ground by the club head **167** to enjoy the game or practice putting.

FIGS. **2**A–**2**C are schematic cross sectional views showing the operation of the spherical object drop mechanism **50** of the present invention. In the example of FIG. **2**, an upper stopper **10**A and a lower stopper **10**B are provided in the spherical object drop mechanism **50**. The relationship between these stoppers and balls **200** is shown in FIGS. **2**A–**2**C. The stopper **10**A and stopper **10**B are made, for example, of straight wire. The configuration of the stopper is merely an example, and it is apparent that many other configurations can be utilized for the same purpose.

The distance between the upper stopper **10***a* and the lower stopper **10**B is established as the size corresponding to the spherical object to be used such as a golf ball. Hence, the distance is established so that only one spherical object can exist between the upper stopper **10**A and the lower stopper **10**B. As will be explained later, the upper stopper **10**A and the lower stopper **10**B operate in the opposite ways with each other (stopper active and stopper release).

The FIG. **2**A shows the operation of the spherical object drop mechanism **50** of the present invention in a default condition. In this condition, the upper stopper **10**A is open (stopper release), and the lower stopper **10**B is closed (stopper active). Thus, the lower stopper **10**B prevents the ball from dropping onto the ground. The user can carry the game apparatus in this default condition to a desired location or wait for his or her turn to play.

The FIG. **2**B shows the operation in the spherical object drop mechanism **50** wherein the user pulled the knob **112** (refer to FIG. **1**) upward. By pulling the knob upward, the handling bar **110** moves upward as well, thereby driving a guide plate **32** (FIG. **3** and FIG. **4**) to be explained later to activate the stoppers in the drop mechanism. Thus, the upper stopper **10**A closes for stopper activation, and the lower stopper **10**B opens for stopper release. Thus, only the lowermost ball **200** drops onto the ground while the other balls **200** that are positioned above the lowermost ball are prevented from moving by the upper stopper **10**A. and are not dropped to the ground. Thus, only the lowermost ball is dropped to the desired spot on the ground (FIG. **2**C).

FIG. **2**C shows the condition of the spherical object drop mechanism **50** wherein the knob **112** is returned to the original position. By using, for example, springs, the inside of the drop mechanism **50** returns to the original position when the user releases the knob **112**. As described in the foregoing, the lowermost ball **200** is already positioned by being dropped onto the ground. As the knob **12** returns to the original position, the stoppers in the drop mechanism also return to the original condition that is identical to the condition shown in FIG. **2**A (default condition). Thus, in the situation of FIG. **2**A, the upper stopper **10**A is opened (stopper release), and the lower stopper **10**B is closed (stopper activation). Thus the balls **200** lower their positions within the drop mechanism in the distance corresponding to the diameter of a ball. By repeating the operation described above, spherical objects can be dropped one by one onto the ground.

As shown above, the ball guide **102** forms a space to store balls and guides the ball to the stopper mechanism in the vertical direction. In this example, the ball guide **102** is configured with a plurality of rod shaped members. However, other shapes are also possible for the ball guide such as a cylindrical shape or a conical shape. By storing several balls in the ball guide **102**, the balls can be conveniently carried along with a golf club. Thus, the balls can be positioned on the ground without requiring the user to bend his or her back.

By the stopper mechanism provided in the spherical object drop mechanism **50** of the present invention, the ball can be dropped one by one as shown in FIGS. **2**A–**2**C as described above. The structure and operation of the spherical object drop mechanism **50** of the present invention is explained in more detail with reference to FIGS. **3**–**7**.

FIG. **3**A and FIG. **3**B show the structure of the stoppers in situation corresponding to that shown in FIG. **2**A and FIG. **2**C, i.e., the default condition. In this situation, the upper stopper **10**A is opened (stopper release), and the lower stopper **10**B is closed (stopper activated). As shown in the exploded view of FIG. **6**, in the spherical object drop mechanism **50** of the present invention, the guide plate **32** is placed in the housing **54**. FIG. **3**A shows the guide plate **32** for setting the stoppers in the default condition, and FIG. **3**B shows the housing **54**.

FIG. **4**A and FIG. **4**B show the condition of the stoppers wherein the knob **112** is pulled upward by the user as shown in FIG. **2**B. In this condition, The upper stopper **10**A is closed (stopper activation), and the lower stopper **10**B is opened (stopper release). FIG. **4**A shows the guide plate **32** setting the stoppers to drop the lowermost ball, and FIG. **4**B shows the housing **54**.

As described above, FIGS. **3**A and **3**B show the condition wherein the knob **112** is not pulled upward (thus in the default condition) as shown in FIGS. **2**A and **2**C. The lowermost ball **200** to be dropped is prevented from being dropped by the closed lower stopper **10**B. Since the upper stopper **10**A is released and is open, the balls above the lowermost balls are on the lowermost ball.

In FIG. **3**A, the guide plate **32** is comprised of a stopper guide gap **33** to control the operation of the upper stopper **10**A, a stopper guide gap **35** to control the operation of the lower stopper **10**B, a spring storage gap **37** to install therein a spring **40** such as a spring coil, and a top portion **36** linking to the handling bar **110**.

In FIG. **3**B, the housing **54** is box-shaped to receive the guide plate **32** therein, and is provided with the spring **40** and stopper slits **12**. In FIGS. **3**A and **3**B, the ball guide **102** and the knob **112** are omitted. As shown in FIGS. **3**A and **3**B, the ends of the upper stopper **10**A and lower stopper **10**B are inserted in the stopper guide gaps **33** and **35** of the guide

plate **32**, respectively. The other ends of the upper stopper **10**A and the lower stopper **10**B are fixed to the housing **52** shown in FIG. **6** or FIG. **7**A through attachment holes (not shown).

Before proceeding the explanation with regard to FIGS. **3** and **4**, an overall structure of the spherical object drop mechanism **50** of the present invention is explained with reference to the exploded view of FIG. **6**. As shown in FIG. **6**, the spherical object drop mechanism **50** of the present invention is comprised of the housing **52** and **54**, an attachment plate **62**, the guide plate **32**, and a cover **42**. The attachment plate **62** covers the shaft **165** of the golf club with the housing **52** for attachment. In this example, the housing **52** and the housing **54** separately provided are attached with each other. However, they can also be integrally constructed as one unit. The cover **42** fixes the guide plate **32** in the housing **54**.

The stopper slits **12** running in horizontal direction described in the foregoing are provided to the housing **54**. As the guide plate **32** moves in the vertical direction, the upper stopper **10**A and the lower stopper **10**B move in horizontal direction through the stopper slits **12**. The other ends of the upper stopper **10**A and the lower stopper **10**B, i.e., the left ends of the stoppers in FIG. **6**, are fixed to the housing by suitable means. The upper stopper **10**A and the lower stopper **10**B are made of, for example, metal with elastic property. Hence, the inner ends of the upper stopper **10**A and the lower stopper **10**B are stationary due to the fixation to the housing while the other ends inserted in the guide plate **32** and the stopper slits **12** move in the horizontal direction through the stopper slits **12**, thereby achieving the opening and closing movements of the stopper **10**A and the stopper **10**B.

As shown in FIG. **3** and FIG. **6**, the upper stopper **10**A and lower stopper **10**B can move only in the horizontal direction while being prevented from the vertical direction movement since the stopper slits **12** extend in the horizontal direction. Thus, in the condition shown in FIGS. **3**A and **3**B, the upper stopper **10**A is located at the slanted portion of the stopper guide gap **33** in the guide plate **32**, and is located at the outer side of the stopper slit **12**. As consequence, the upper stopper **10**A is released. On the other hand, the lower stopper **10**B is located at the vertical portion of the stopper guide gap **33** in the guide plate **32**, and is located at the inner side of the stopper slit **12**. Accordingly, the upper stopper **10**A is closed. In other words, the vertical movement of the guide plate **32** is converted to the horizontal movement of the upper stopper **10**A and the lower stopper **10**B.

In FIGS. **3**A and **3**B, the upper stopper **10**A and the lower stopper **10**B fitted in the guide gaps of the guide plate **32** in FIG. **3**A are in the same vertical positions as that of the upper stopper **10**A and the lower stopper **10**B fitted in the stopper slits **12** in FIG. **3**B. As shown above, the upper stopper **10**A is located at the slanted portion of the guide gap **33**. Due to the horizontal movement through the slit **12**, the upper stopper **10**A opens. Conversely, the lower stopper **10**B located at the vertical portion of the stopper guide gap **35** will close. Since the balls are prevented from free passage, they will not drop from the drop mechanism **53**.

FIG. **5**A shows the stoppers in the condition of FIGS. **3**A and **3**B seen from the top of the housings **52** and **54**. For the ease of explanation and simplicity, the ball **200** are not shown in Figure SA. As shown in FIG. **5**A, the lower stopper **10**B is closed, and the ball is prevented from being dropped onto the ground. The upper stopper **10**A is opened that allows enough opening for the passage of the balls. Thus, the balls above the lowermost ball can freely go therethrough.

Referring to FIG. **4**, the operation of the spherical object drop mechanism **53** when dropping the ball is described in more detail. FIGS. **4**A and **4**B show the condition of the stoppers wherein the upper stopper **10**A is closed and the lower stopper **10**B is opened to drop the lowermost ball when the knob **112** is pulled upward as shown in FIG. **2**B. FIG. **4**A shows the relationship between the stoppers and the guide plate **32**, and FIG. **4**B shows the relationship between the stoppers and the stopper slits **12**.

As shown in FIG. **4**A, the guide plate **32** is pulled upward in the housing **54**. The upper stopper **10**A and the lower stopper **10**B are so positioned as to open the upper stopper **10**A and the lower stopper **10**B. Thus, the upper stopper **10**A is positioned in the inner vertical portion of the stopper guide gap **33**. This movement is converted to the horizontal movement by the stopper slits **12** shown in FIG. **4**B, thereby closing the upper stopper **10**A. Since the passage of the ball is prohibited, the balls above the lowermost ball will not drop from the drop mechanism.

The lower stopper **10**B is located at the slanted outer portion of the stopper guide gap **35**. When this movement is converted to horizontal movement by the stopper slit **12** shown in FIG. **4**B, the lower stopper **10**B opens. Thus, the lowermost ball **200** drops to the ground by the gravity. As described above, the upper stopper **10**A is closed to prevent other balls from dropping, and only the lowermost ball is dropped to the ground.

FIG. **5**B is a top view showing the operation of dropping the ball as viewed from the top of the housings **52** and **54**. For the ease of explanation and simplicity, the ball **200** is not shown in FIG. **5**B. As shown in FIG. **5**B, the upper stopper **10**A is closed, thereby preventing the balls above the lowermost ball from dropping on the ground. The lower stopper **10**B is opened to allow enough space for the passage of the lowermost ball. Thus, only the lowermost ball drops to the ground by the gravity.

After the lowermost ball is dropped, the guide plate **32** moves downward to return to the original position (default position). FIG. **2**C shows this condition wherein one ball is positioned on the ground and the remaining balls go down one step within the drop mechanism **53**. The upper stopper **10**A is positioned in the slanted outer portion of the stopper **33**. When this movement is converted to the horizontal movement, the upper stopper **10**A opens. Hence the balls above the lowermost ball can freely go through. The lower stopper **10**B is located to the inner vertical portion of the stopper guide gap **35**. When converted to the horizontal movement, the lower stopper **10**B closes. Thus, the balls **200** go one step down within the drop mechanism **50**. This condition is identical to the one shown in FIG. **3**. The top view of the housings **52** and **54** is identical to the one in FIG. **5**A.

By repeating the operation described in the foregoing, the spherical object drop mechanism **50** can drop the balls one by one onto the ground. Since the game apparatus of the present invention has a simple mechanical structure, it is strong and reliable requiring less maintenance, and can be produced economically with low cost.

Although only a preferred embodiment is specifically illustrated and described herein, it will be appreciated that many modifications and variations of the present invention are possible in light of the above teachings and within the purview of the appended claims without departing the spirit and intended scope of the invention.

What is claimed is:

1. A game apparatus having a spherical object drop mechanism for dropping spherical objects one by one on the ground, the spherical object drop mechanism comprising:

a housing for storing a plurality of spherical objects to allow vertical movements of the spherical objects therein by their own weight;

a first stopper provided in the housing for stopping the vertical movement of the spherical objects or releasing the stop operation;

a second stopper provided in the housing located at a lower location of the first stopper by the distance corresponding to the diameter of the spherical object for stopping the vertical movement of the spherical objects or releasing the stop operation;

a stopper drive means to operate the first stopper and the second stopper for the stopping and releasing movements in opposite ways with each other; and

a knob to operate the stopper drive means from outside;

wherein the stopper drive means is comprised of a guide plate connected to the knob and horizontal slits provided on the housing, and

wherein the first stopper and the second stopper are fitted in guide gaps provided on the guide plate and the horizontal slits on the housing, and

when the guide plate moves in the vertical direction by the movement of the knob, the first and second stoppers move in the horizontal directions in the horizontal slits.

2. A game apparatus as defined in claim **1**, wherein, when the knob is in a steady state without being pulled upward, the first stopper is released so as to allow the vertical movement of the spherical objects, and at the same time, the second stopper is activated to prohibit the vertical movement of the spherical objects, thereby prohibiting the spherical objects as a whole from dropping on the ground.

3. A game apparatus as defined in claim **1**, wherein, when the knob is pulled upward, the first stopper is activated to prohibit the vertical movement of the spherical object, and at the same time, the second stopper is released so that only a lowermost spherical object moves in the vertical direction to drop on the ground.

4. A game apparatus as defined in claim **1**, wherein, the guide gaps provided on the guide plate have slanted portions, thereby creating the horizontal movements of the first and second stoppers when the guide plate moves in the vertical direction.

5. A game apparatus as defined in claim **1**, wherein, the guide plate is biased downwardly by a spring force and is moved upward only when the knob is pulled upward, thereby activating the first stopper and releasing the second stopper.

6. A game apparatus for dropping spherical objects one by one on the ground, comprising:

a ball hitting rod having a shaft of substantially straight shape, a hitting face provided at one end of the shaft for hitting a spherical object and a grip provided at another end of the shaft for a user to handle the ball hitting rod;

a spherical object drop mechanism attached to the ball hitting rod in a parallel fashion for dropping the spherical objects one by one on the ground;

a spherical object container provided at an upper position of the spherical object drop mechanism for storing a plurality of spherical objects therein and providing the spherical objects to the drop mechanism; wherein the spherical object drop mechanism, comprising:

a housing for storing a plurality of spherical objects to allow vertical movements of the spherical objects therein by their own weight;

a first stopper provided in the housing for stopping the vertical movement of the spherical objects or releasing the stop operation;

a second stopper provided in the housing located at a lower location of the first stopper by the distance corresponding to the diameter of the spherical object for stopping the vertical movement of the spherical objects or releasing the stop operation;

a stopper drive means to operate the first stopper and the second stopper for the stopping and releasing movements in opposite ways with each other; and

a knob to operate the stopper drive means from outside.

7. A game apparatus as defined in claim **6**, wherein, when the knob is in a steady state without being pulled upward, the first stopper is released so as to allow the vertical movement of the spherical objects, and at the same time, the second stopper is activated to prohibit the vertical movement of the spherical objects, thereby prohibiting the spherical objects as a whole from dropping on the ground.

8. A game apparatus as defined in claim **6**, wherein, when the knob is pulled upward, the first stopper is activated to prohibit the vertical movement of the spherical object, and at the same time, the second stopper is released so that only a lowermost spherical object moves in the vertical direction to drop on the ground.

9. A game apparatus as defined in claim **6**, wherein, the stopper drive means is comprised of a guide plate connected to the knob and horizontal slits provided on the housing, and

wherein the first stopper and the second stopper are fitted in guide gaps provided on the guide plate and the horizontal slits on the housing, and

when guide plate moves in the vertical direction by the movement of the knob, the first and second stoppers move in the horizontal directions in the horizontal slits.

10. A game apparatus as defined in claim **9**, wherein, the guide gaps provided on the guide plate have slanted portions, thereby creating the horizontal movements of the first and second stoppers when the guide plate moves in the vertical direction.

11. A game apparatus as defined in claim **9**, wherein, the guide plate is biased downwardly by a spring force and is moved upward only when the knob is pulled upward, thereby activating the first stopper and releasing the second stopper.

12. A game apparatus as defined in claim **6**, wherein the spherical object is a golf ball and the ball hitting rod is a golf club.

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